

REMARKS/ARGUMENTS

Reconsideration is respectfully requested of the Final Rejection of December 14, 2009 relating to the above identified application.

The claims in the case are 1 to 3 and 5.

A one-month extension of time and the associated fees are filed herewith.

All rejections not restated in the Final Rejection have been withdrawn.

As noted on page 2, paragraph 2, the IDS of April 29, 2009 contained a typographical error . The correct patent number is 4,877,595 and a corrected IDS is filed herewith.

Claims 1 and 2 stand rejected under 35 U.S.C. 102(b) as anticipated by Nowak et al (US 2001/0047047). Applicants traverse the rejection and request reconsideration for reasons set forth below.

Claims 3 and 5 stand rejected under 35 U.S.C. 103(a) as unpatentable in view of Nowak et al, *supra*, and applicants traverse and request reconsideration for reasons set forth below.

Claims 1-3 and 5 stand rejected under 35 U.S.C. 103(a) as unpatentable in view of Meyer et al, US 2002/0077388. Applicants traverse and request reconsideration for reasons set forth below.

Claims 1-3 and 5 stand rejected under 35 U.S.C. 103(a) as unpatentable in view of Meyer et al taken with Kingle et al US 4,877,595. Applicants traverse and request reconsideration for reasons set forth below.

Claims 1-3 and 5 stand rejected under 35 U.S.C. 103(a) as unpatentable in view of Gruenewaelder et al WO 2001/090271 taken with Hasenzahl et al US 2002/0197311. Applicants

traverse and request reconsideration for reasons set forth below.

The subject matter that is claimed in this application is adequately discussed with respect to the cited references in applicants' amendment of August 25, 2009 and the remarks made there are incorporated herein by reference.

The issue in this case involves the evidence previously submitted in the form of Dr. Nowak's Declaration and whether that evidence overcomes any alleged *prima facie* obviousness based on the references of record.

The Declaration by Dr. Nowak was criticized in the Final Action on page 7 c.f. and applicants have sought to respond to each point in the Final Action below.

With respect to:

- (1) the question raised at the top of page 8 of the Final Action of whether the silica R 8200 exhibits the same properties as the silica identified by the code W90 and W 60 and
- (2) the question about the rheological properties for the R 8200 product, as implied on page 7, applicants have provided the following comments:

AEROSIL R 8200 is a structure modified, hydrophobic fumed silica, which is destructured by a ball mill. As a result, the structure of the AEROSIL R 8200 Fumed Silica is much lower than the structure of for example AEROSIL R 202 W 60 or AEROSIL R 202 VV 90. These significant different structures can be seen on TEM-pictures (see **attachment 1**). The microphotographs were taken under the same magnification. Thus the thickening efficiency of AEROSIL R 8200 is significant lower compared to for example AEROSIL R 202 VV 60 or AEROSIL R 202 VV 90. As a result, AEROSIL R 8200 is not a thickening agent and thixotrope

compared to AEROSIL R 202 VV 60 or AEROSIL R 202 VV 90. In contrast, AEROSIL R 8200 is a reinforcing agent with very low thickening properties. AEROSIL R 8200 is no thixotrope. Claim 1 of the present invention refers to thixotropic adhesive and sealant compositions. Non-thixotropic compositions are excluded by applicants' claims.

As described below, there are listed viscosities and thixotropic-indices of a 2K-epoxy resin filled with 3.85 % each of AEROSIL R 8200, AEROSIL R 202 W 60 and AEROSIL R 202 W 90, respectively, which prove the above statement:

2K-epoxy resin filled with 3.85 % AEROSIL R 8200:
viscosity: 8 Pa s Thixotropic-Index: 1.3

2K-epoxy resin filled with 3.85 % AEROSIL R 202 W 60:
viscosity: 50 Pa s Thixotropic-Index: 5.2

2K-epoxy resin filled with 3.85 % AEROSIL R 202 VV 90:
viscosity: 48 Pa s Thixotropic-Index: 5.1

3.85 % is a realistic fumed silica concentration for adhesives and sealant applications.

These results show the significant difference regarding the application-related properties:

The epoxy systems containing the AEROSIL R 202 W 60 and AEROSIL R 202 VV 90 show thixotropic and a pasty like behavior, whereas the epoxy system filled with AEROSIL R 8200 shows a behavior like a liquid. The epoxy systems filled with AEROSIL R 202W 60 and AEROSIL R 202W 90 show a very high Thixotropic-Index of 5.2 and 5.1, whereas the Thixotropic- Index of the epoxy system filled with AEROSIL R 8200 is very low. Generally,

adhesive and sealant systems having a Thixotropic-Index of higher than 3 are very thixotropic, and adhesive and sealant systems having a Thixotropic-Index of almost 1.0 or smaller show no thixotropy.

At the top of page 8 (line 4) of the Final Action, it is said that no weight percent amount was given for applicants' compositions that were tested. In response, applicants are indeed able to show that the compositions tested fell within the range of 1 to 15 % as recited in the claims.

Also, the Final Action asks whether the comparison was based on a single experiment or whether multiple experiments were performed to obtain statistically relevant results.

Applicants respond in detail herein below.

The examiner also states that the thixotropic data was not provided for the non-compacted sample. However, applicants point out that the most relevant comparison for the issue in this case is the comparison between AEROSIL R 8200 (destructured with a ball mill) and the AEROSILs that have been subjected to the action of the roller compactor or the pressing filter belt. And that data appears above and also in what follows.

With regard to the reported data comparing AEROSIL R 202 W 90 (18 minutes) and AEROSIL R 202 (25 minutes), the concentrations of AEROSIL R 202 and AEROSIL R 202 W 90 had been each 4 weight per cent in the polyurethane adhesive. The viscosity of the polyurethane adhesives thixed with AEROSIL R 202 was 78 Pa s, and with AEROSIL R 202 W 90 the viscosity was 73 Pa s. The viscosity specification for this polyurethane adhesive was 80 +- 10 Pa s.

These production trials whereby this data was collected were carried out at a customer of assignee Evonik Degussa and had been single experiments for each test condition. However, the technical director of the customer of Evonik Degussa had told Evonik Degussa that the shorter incorporation time of 18 minutes using AEROSIL R 202 W90 compared to 25 minutes using AEROSIL R 202 had been significant and relevant for them. Moreover, assignee's customer has found also comparable results in other polyurethane adhesives. As a result , assignee's customer will save money because of the shorter incorporation time of AEROSIL R 202 W 90 . These results of the production trials of assignee's customer confirm the results of the laboratory experiments carried out by applicants as shown in the present application. These results also establish that the results reported herein are statistically significant.

With respect to Argument B, and the discussion on the second half of page 8 and continuing on to the top of page 9, the Final Action makes the point that while applicants' data has shown that the compacted silica is different in behavior compared to uncompacted silica, the data does not show the criticality of the roller compactor or pressing filter belt compared to compacted silica produced by other means.

In reply applicants point out that AEROSIL R 8200 is a hydrophobic, structure modified fumed silica, which is densified by other means, namely by a ball mill. However, AEROSIL R 8200 is a reinforcing agent and not a thixotrope and can not be used to render adhesive and sealant compositions thixotropic using 1 wt.-% to 15 wt.-% of the fumed silica. The most relevant comparison for purposes of establishing unexpected results is the data

reported below, which is the same as mentioned above.

In the following there are listed viscosities and thixotropic-indices of a 2K-epoxy resin filled with 3.85 % each of AEROSIL R 8200, AEROSIL R 202 W 60 and AEROSIL R 202 W 90 which prove the above statement:

2K-epoxy resin filled with 3.85 % AEROSIL R 8200:
viscosity: 8 Pa s Thixotropic-Index: 1.3

In contrast, the following data represents subject matter of the present invention which clearly demonstrates thixotropic behavior.

2K-epoxy resin fitted with 3.85 % AEROSIL R 202 VV 60:
viscosity: 50 Pa s Thixotropic-Index: 5.2

2K-epoxy resin fitted with 3.85 % AEROSIL R 202 VV 90:
viscosity: 48 Pa s Thixotropic-Index: 5.1

3.85 % is a realistic fumed silica concentration for adhesives and sealant applications.
These results show the significant difference regarding the thixotropic properties obtained as a result of this invention.

Once again, it is to be noted that the epoxy systems thixed with AEROSIL R 202 W 60 and AEROSIL R 202 VV 90 show thixotropic and a pasty like behavior, whereas the epoxy system filled with AEROSIL R 8200 shows a behavior like a liquid. The epoxy systems thixed with AEROSIL R 202W 60 and AEROSIL R 202W 90 show a very high Thixotropic-Index of 5.2 and 5.1, whereas the Thixotropic- Index of the epoxy system filled with AEROSIL R 8200 is very low. Generally, adhesive and sealant systems having a Thixotropic-Index of higher than 3

are very thixotropic, and adhesive and sealant systems having a Thixotropic-Index of almost 1.0 or smaller show no thixotropy.

Furthermore, in the **attachment 2**, which compares the rheological properties of AEROSIL R 8200 versus AEROSIL R 812 W 60 in an sealant composition, also shows that AEROSIL R 8200 exhibits even at a concentration of 15 wt.- % a low viscosity of 10 Pa s , and therefore can not be used to adjust adhesive and sealant compositions to form thixotropic compositions compared for example to AEROSIL R 812 S W 60.

In other words, AEROSIL R 8200 shows a significantly different behavior than the silicas identified by the code W 60 and W 90.

At the top of page 9 of the Final Action it said that the AEROSIL 150 product and the AEROSIL R 8200 product both have densities within the claimed range and that the Declaration of Dr. Nowak allegedly does not show that unexpectedly different results would be obtained.

In reply applicants point out that AEROSIL 150 is a hydrophilic fumed silica grade. However, the present invention claims special hydrophobic densified fumed silica grades.

AEROSIL R 8200 is a hydrophobic, structure modified fumed silica, which is densified by a ball mill. However, AEROSIL R 8200 is a reinforcing agent and not a thixotrope and can not be used to render adhesive and sealant compositions thixotropic using 1 wt.-% to 15 wt.-% of the fumed silica.

Applicants again list the comparisons to show the differences in viscosities and thixotropic-indices of a 2K-epoxy resin fitted with 3.85 % each of AEROSIL R 8200, AEROSIL R 202 W 60 and AEROSIL R 202 W 90 which prove the above statement:

2K-epoxy resin filled with 3.85 % AEROSIL R 8200:

viscosity: 8 Pa s Thixotropic-Index: 1.3

2K-epoxy resin fitted with 3.85 % AEROSIL R 202 W 60:

viscosity: 50 Pa s Thixotropic-Index: 5.2

2K-epoxy resin filled with 3.85 % AEROSIL R 202 VV 90:

viscosity: 48 Pa s Thixotropic-Index: 5.1

Again, these results show the significant and unexpected difference to be obtained by following the teachings of the present invention.

The results are repeated again : The epoxy systems thixed with AEROSIL R 202 W 60 and AEROSIL R 202 W 90 show thixotropic and a pasty like behavior, whereas the epoxy system filled with AEROSIL R 8200 shows a behavior like a liquid. The epoxy systems thixed with AEROSIL R 202W 60 and AEROSIL R 202W 90 show a very high Thixotropic-Index of 5.2 and 5.1, whereas the Thixotropic- Index of the epoxy system filled with AEROSIL R 8200 is very low. Generally, adhesive and sealant systems having a Thixotropic-Index of higher than 3 are very thixotropic, and adhesive and sealant systems having a Thixotropic-Index of almost 1.0 or smaller show no thixotropy.

Attention is again invited to **attachment 2**, which compares the rheological properties of AEROSIL R 8200 versus AEROSIL R 812 W 60 in an sealant composition, and is submitted to demonstrate that AEROSIL R 8200 shows unexpectedly that even at a concentration of 15 wt.- % there is obtained a low viscosity of 10 Pa s , and therefore can not be used to produce adhesive and sealant composition that are considered thixotropic as compared for example to

AEROSIL R 812 S W 60.

Thus **attachment 2** is evidence to show that AEROSIL R 8200 shows a significantly and unexpectedly different behavior than the silicas identified by the code W 60 and W 90.

With regard to the comments in the Final Action concerning Argument C found on page 9, the examiner notes that the silica prepared by ball milling has a compacted density which overlaps the density of the silica used in the present invention and takes the position that no evidence has been submitted to show that ball milled compacted silica behaves differently.

In reply, applicants again reiterate that AEROSIL R 8200 is a hydrophobic, structure modified fumed silica, which is densified by a ball mill. However, AEROSIL R 8200 is a reinforcing agent and not a thixotrope and can not be used to render adhesive and sealant compositions thixotropic using 1 wt.-% to 15 wt.-% of the fumed silica as described in claim 1 of the present invention.

Again, applicants call attention to the below listed viscosities and thixotropic-indices of a 2K-epoxy resin filled with 3.85 % each of AEROSIL R 8200, AEROSIL R 202 W 60 and AEROSIL R 202 W 90 which prove above statement:

2K-epoxy resin filled with 3.85 % AEROSIL R 8200:
viscosity: 8 Pa s Thixotropic-Index: 1.3

2K-epoxy resin fitted with 3.85 % AEROSIL R 202 W 60:
viscosity: 50 Pa s Thixotropic-Index: 5.2

2K-epoxy resin fitted with 3.85 % AEROSIL R 202 VV 90:
viscosity: 48 Pa s Thixotropic-Index: 5.1

As pointed out above, these results show the significant difference regarding the application-related properties:

The epoxy systems thixed with AEROSIL R 202 W 60 and AEROSIL R 202 W 90 show thixotropic and a pasty like behavior, whereas the epoxy system filled with AEROSIL R 8200 shows a behavior like a liquid. The epoxy systems thixed with AEROSIL R 202 W 60 and AEROSIL R 202 W 90 show a very high Thixotropic-Index of 5.2 and 5.1, whereas the Thixotropic- Index of the epoxy system filled with AEROSIL R 8200 is very low. Generally, adhesive and sealant systems having a Thixotropic-Index of higher than 3 are very thixotropic, and adhesive and sealant systems having a Thixotropic-Index of almost 1.0 or smaller show no thixotropy.

Again applicants make reference to **attachment 2** for a comparison of the rheological properties of AEROSIL R 8200 versus AEROSIL R 812 W 60 in an sealant composition, and also shows that AEROSIL R 8200 even at a concentration of 15 wt.- % exhibits a low viscosity of 10 Pa s, and therefore can not be used to form adhesive and sealant compositions of a thixotropic character compared for example to AEROSIL R 812 S W 60.

Attachment 2 is submitted to establish that AEROSIL R 8200 shows a significantly different behavior than the silicas identified by the code VV 60 and W 90 .

The discussion regarding the thickening effect, which begins at the top of page 10 of the Final Action, indicates that the examiner is not convinced that the Nowak Declaration has shown any unexpected results. The examiner points to the disclosure of Meyer (with the same assignee as herein) which discusses no negative effect on rheology or viscosity during

incorporation: The examiner concludes that Meyer would also reduce the amount of stirring necessary to cause the silica to become well dispersed in the composition.

Applicants respond as follows: The Meyer Patent ('388) discusses AEROSIL R 8200 in UV-coatings to improve the scratch resistance, see (0013) and (0014), and not in adhesives and sealants to render the compositions thixotropic. Furthermore, in (0015) it is mentioned that: "The silicas according to the invention have only a slight influence on the rheology of the coating system. Because the viscosity of the coating is increased only slightly, relatively large amounts of silica can be incorporated into the coating." This statement confirms applicants' statement shown with the low viscosity of 8 Pa s and a low Thixotropic-Index of 1.3 using 3.85 % AEROSIL R 8200 in the epoxy resin, see **attachment 1**. Also in a sealant, 15 wt.- % of AEROSIL R 8200 achieves only a low viscosity of 10 Pa s, see **attachment 2**. As a result, AEROSIL R 8200 is not a thixotrope and does not function as a thickening agent compared to the claimed VV 60 and W 90 grades. AEROSIL R 8200 can be used as reinforcing agent and to improve for example the scratch resistance of coatings but not to render adhesive and sealant composition thixotropic.

That AEROSIL 8200 is an excellent reinforcing agent with low thickening properties is shown by the graphs in **attachment 3**. At high loading levels, the tear resistance of the sealant filled with AEROSIL 8200 increases sharply thereby demonstrating its reinforcing properties.

Furthermore, the AEROSIL R 8200 needs even higher incorporation times in liquid systems, because the required silica loading levels are significantly higher compared to the W 60 and VV 90 grades.

The claimed VV 60 and VV 90 grades show significantly lower incorporation times, although the rheological and thixotropic properties of the thixed adhesives and sealants are at the same high level compared to the undensified grades. Finally, the thickening effect of the finished compositions had been measured separately by rotational Brookfield viscometers in a second step. In a first step the incorporation time of the silicas during the mixing process had been measured, and not the mixing viscosity during the incorporation time of the silicas.

With Regard to Argument D which begins at the bottom of page 10, the Final Action points out that although Meyer shows a ball mill for compacting, the Meyer document is not limited to compacting by this method. The Final Action takes the position that the disclosure in the Kingle reference would motivate a person to combine the references because Kingle teaches a method to provide equivalent transparency and greater compression. This section of the Official Action indicates the examiner believes that a combination of Kingle with Meyer would inherently produce a reduction in the mixing time for the silica.

In reply, applicants point out that Kingle does not show that the hydrophobic densified silicas which have been densified by this pressing filter method exhibit a shorter incorporation time while maintaining the thickening and thixotropic properties of the adhesives and sealant compositions. Furthermore, Kingle does not show as in the present invention that unexpectedly hydrophobic densified fumed silicas perform better than hydrophilic densified fumed silicas. Although hydrophilic densified fumed silica exhibit a shorter incorporation time in adhesive and sealant compositions, the thickening and thixotropic decrease of the

adhesive and sealant compositions thixed with hydrophilic densified fumed silicas compared to the undensified grades is too high for an industrial use. Following example provide support for this statement: (AEROSIL 150 is a hydrophilic fumed silica):

	Incorporation time	Viscosity
8% AEROSIL 150 in a sealant:	45 s	130 Pa s
8% AEROSIL 150W90 in a sealant:	17s	115Pas

Furthermore a combination of Klingle and Meyer would not result in a product that is useful for its intended purpose. Firstly, because it is not possible to achieve with the Klingle densification the compaction of Meyer, and secondly, the thixotropic and thickening properties of the silicas would be destroyed. Meyer uses a ball mill so the fumed silica is being destructure, see **attachment 1**, and the silica would loose its thickening and thixotropic properties.

Finally, the Klingle equipment does not have the high mechanical forces compared to a ball mill in order to destructure the silica. Therefore, applicants submit that the Final Action does not provide a well-reasoned explanation for the motivation to modify the teachings of Meyer with the teachings of Klingle.

With regard to the final Argument E, the Final Action relies on the Gruenewaelder reference. The examiner points out on page 12 that the silica of the reference has a density of 80 to 260 g/l. Presumably, he refers to the density taught by the Hasenzahl reference.

Applicants reply as follows: Gruenewaelder teaches that a fumed silica , for example AEROSIL R 202 , adjusts pseudoplastic behaviour and thixotropy for polyurethane adhesives. This is correct , but this behavior refers only to the finished compound when the silica has been fully incorporated and dispersed into the binder and stored for some time in order to develop the three-dimensional network of silica particles which cause macroscopically the thickening and thixotropy, and not when the silica is in the process of being incorporated into the binder. When the silica is in the process of being incorporated and dispersed into the binder the pseudoplasticity is not yet developed. So, the assumption in the Final Action that the incorporation time would be reduced is not correct.

Hasenzahl does not teach that by using special densified hydrophobic fumed silica grades the incorporation time of the silicas can be significantly decreased, while the rheological and thixotropic properties of the adhesive and sealant formulations can be maintained compared to state-of-the art fumed silica grades.

Hasenzahl teaches that the flowability of pharmaceutical and cosmetic preparations is markedly higher than that of the state-of the art preparations when higher densified fumed silica having densities of 100 to 200 g/l are used. In addition, the mechanical stability of tablets formulated with such preparations is improved and the capsule weight is increased (0017, 0018).

The rejection in the Final Action fails to explain any motivation whereby a person having ordinary skill in this art would be lead to believe that the products of Gruenewaelder could be improved or enhanced by the product of Hasenzahl. In fact there is a total absence of

any motivation for the combination. The rejection fails to establish a case of *prima facie* obviousness. And further any alleged obviousness is overcome by the evidence produced by applicants.

For all the reasons set forth by applicants in this application, it is respectfully submitted that the rejection is improper and should be withdrawn.

Favorable action at the examiner's earliest convenience is respectfully requested.

Respectfully submitted,



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